Climate Change and Western Water Group (CCAWG) –Reclamation Managers Workshop Executive Summary

Bureau of Reclamation's Research and Development Office invited other Federal agencies with a stake in western water to meet with Reclamation managers and decision makers to discuss climate change. A two-day workshop was held on February 20th and 21st at the Denver Federal Center and proved to be a highly effective forum to discuss a research agenda for managing western water as climate changes.

Workshop Objectives:

At a working level, the workshop established a better understanding of climate change science and information needs of Reclamation water operations and environmental compliance managers. Federal participants included Reclamations partners in CCAWG (the USGS and NOAA) as well as scientists and managers from the US Forest Service, the US Fish and Wildlife Service, the US Army Corps of Engineers, and NOAA's Regional Integrated Sciences and Assessments (RISA) program.

Executive Summary by Bureau of Reclamation Research and Development Office

The first day session was focused on developing knowledge and relationships between all of the participants. Two panels were held. The first panel featured Reclamation's water operations managers from each of Reclamation's five regions as well as the Dam Safety Office. The second panel, with representation also from the five regions as well as the Office of Program and Policy Service, featured environmental compliance decision makers. The discussions during both panels proved a two way communication of the types of information that are currently included into decisions (e.g. NEPA and ESA Consultations) within Reclamation as well as the types of information's that would be on the managers wish list. The day ended with presentations from Robert Webb (NOAA) and Warren Day (USGS) that focused on their agency's respective capabilities, roles, and interest in climate change related research and development in Support of Western Water Management

The morning of the second day began with a presentation by Jim Verdin on the National Integrated Drought Information System (NIDIS). Three handouts (http://www.esrl.noaa.gov/psd/workshops/mwwcc/docs/Handouts_080219_final.pdf) were then provided by Reclamation to all attendees that focused on – Handout 1 -- a analysis of the analytical elements that go into incorporating climate change into a long-term planning process and where Reclamation feels that there are gaps in our abilities to accomplish these elements and Handouts—2 & 3) -- the ongoing and proposed projects, respectively, both within Reclamation as well as with CCAWWG partners that may address the gaps identified in Handout 1. Levi Brekke and David Raff of the Bureau of Reclamation led the discussion. They, along with the technical team of CCAWWG, had assembled the documents. A significant portion of time was spent on discussions related to the analytical elements and gaps. The second day was wrapped up through discussions led by Andrea Ray of NOAA on thoughts about training, knowledge transfer, outreach and communication. The end result of both sessions was the establishment of better understanding of the roles, responsibilities, perspectives, and capabilities of both

the scientific and end-user communities, which is essential to jointly develop relevant research for the integration of climate change into western water management.

Two tear sheets were distributed to all interested parties. The first tear sheet asked water and environmental managers to share their thoughts on research priorities by evaluating the gaps from Handout 1 for low to high priorities both in the near-term and long-term (Table 1). The second tear sheet asked scientists to share their thoughts on research priorities for the gaps from Handout 1 for low to high priorities based on both the relevance to their agency as well as the feasibility to address the gap.

Recurring Themes

- Reclamation has a need to identify the roles that a changing climate will play into its long term planning processes, operations studies, and dam safety decisions.
- Water operations managers need improved weather and climate forecasts from days to decades.
- Climate change information for long term planning from the supply side is somewhat understood but very little is known about the demand side.
- There are many climate services within the federal government (NOAA, USGS) that can be looked to for information and guidance on data usage.
- Reclamation and CCAWWG have taken a pro-active approach to addressing climate change within the context of western water management.

Table 1. Analytical Elements, Planning Capability Gaps and Surveyed Research Priorities among Attendees at the CCAWWG Workshop

Planning Capability Gaps by Analytical Element (Table 1)	Surveyed Priority: light to dark shading represents lower to higher priority
1. Literature Reviews	
1.1 Clearinghouse, Scientific Literature on Relating Climate Change to Water Resources Planning	
1.2 Region-specific Literature Summaries	
2. Obtain Climate Projections Data	
2.1 Downscaled data at finer resolutions (space and/or time) and different variables	
2.2 Downscaled data that isn't based on "stationarity" (e.g., potentially revealed using regional climate models)	
3. Translate climate projection data into planning scenarios	
3.1 Basis for weighting Emissions Paths	
3.2 How to jointly consider paleoclimate, near-term climate variability, and projected climate	
3.3 How to assess extreme meteorological possibilities in a changing climate	
4a. Assess Natural Systems Response	
4a.1 Climate impact on groundwater and interaction with surface water	
4a.2 Climate impact on land cover and ecosystems	
4a.3 How to assess flood control rule requirements in a changing climate	
4a.4 How to assess extreme hydrologic possibilities related to dam safety in a changing climate	
4a.5 Guidance on runoff analysis dependence on method/tool; and method/tool preference	
4b. Assess Social Systems Response	
4b.1 How to project social responses to that constrain operations (e.g., water demands, flood protection, environmental values)	
4b.2 Crop water demand response to climate and atmospheric carbon dioxide changes	
5. Assess Operations and Dependent Resources Response	
5.1 Experience conducting policy-search studies (e.g., "crystal-ball" operator, optimization)	
5.2 How to blend "static" and "crystal-ball" operator depictions into realistic portrayal of operations unfolding under climate change	
5.3 How to analyze operations impacts on climate	
6. Assess, Characterize and Communicate Uncertainties	
6.1 How to assess and characterize uncertainties by element	
6.2 How to assess uncertainties interrelate and/or compound across elements	
6.3 Experience communicating uncertainties associated with climate change and its relation to Reclamation planning processes	

Actions and Next Steps

- A website has been established (http://www.esrl.noaa.gov/psd/workshops/mwwcc/) that contains all of the handouts from the workshop as well as to contain future items for the workgroup.
- Tearsheets of management and research priorities passed out at the workshop will be synthesized and posted on the website. The priorities identified in the tearsheets will be used in the pursuit of research by CCAWWG agencies and will be updated as additional vetting with western water user groups occurs.
- FY08 Research and Development priorities for Climate Change will be established
- Additional proposed research forms or identification of ongoing research available at

http://www.esrl.noaa.gov/psd/workshops/mwwcc/docs/NewResearchProjectIdeas.pdf and http://www.esrl.noaa.gov/psd/workshops/mwwcc/docs/OngoingResearchProjects.pdf, respectively and can be submitted to technical team of CCAWWG (contact David Raff draff@do.usbr.gov or Levi Brekke lbrekke@do.usbr.gov)

- CCAWWG will continue to engage with additional federal agencies as well as western state, municipal and agricultural water user group communities.
- Additional comments on analytical element development can be submitted to technical team of CCAWWG (contact David Raff draff@do.usbr.gov or Levi Brekke lbrekke@do.usbr.gov).